

Neutrino Factory Collaboration



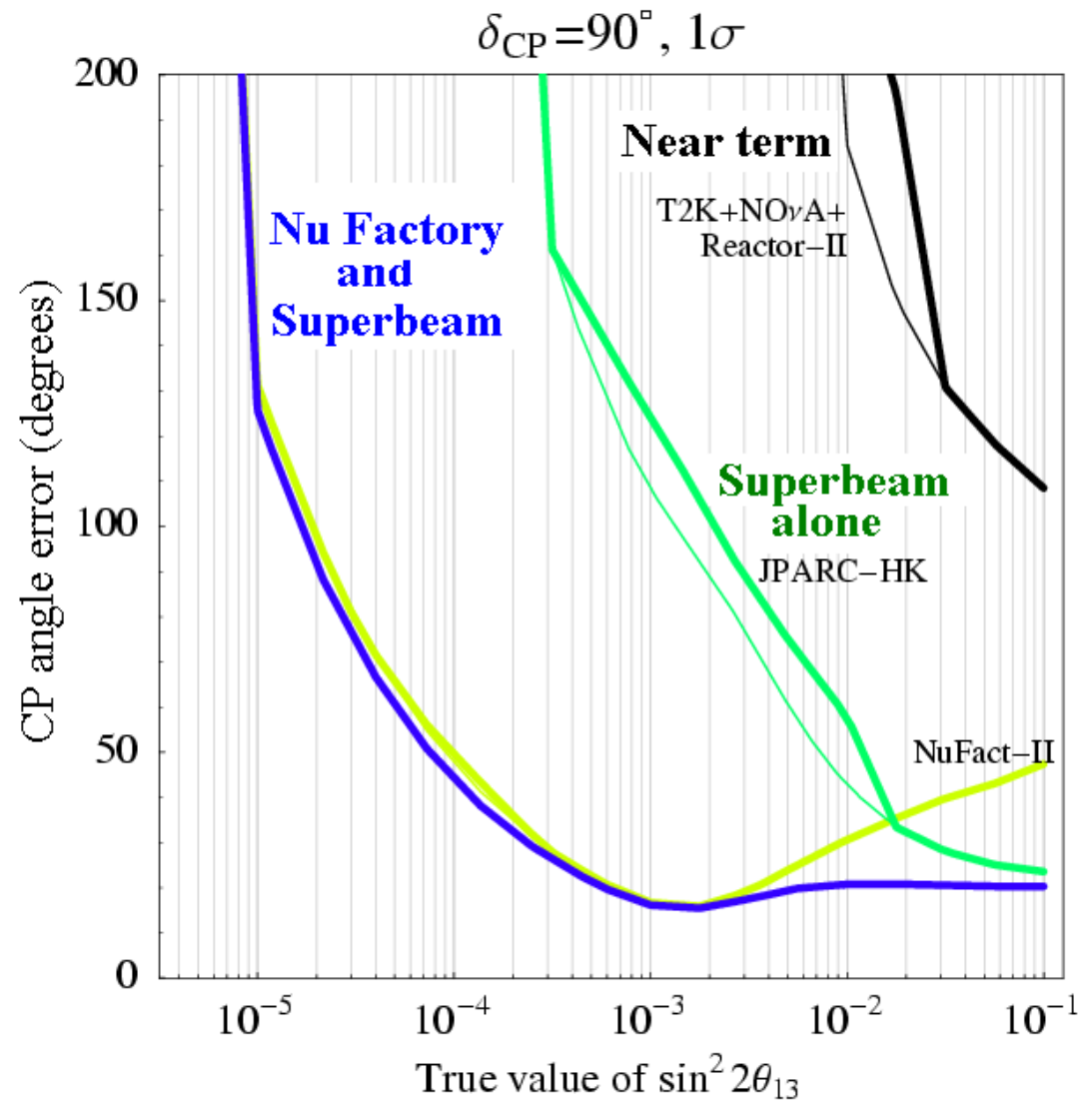
R B Palmer Fermi-BNL
Meeting 11/14/05

- Existing Collaboration
BNL, Cornell, Fermi, LBNL, US Universities
CERN, RAL (UK), INFN (Italy), Universities
KEK, Osaka, other Universities
- May be needed in the long run
 - Offers more channels and lower backgrounds
 - Only way to study leptonic CP violation if $\sin^2(2\theta_{13}) < 0.01$
- Solid target radiation studies
- Mercury jet target studies
Might have application for super-beam

θ_{13} Limits for CP observation

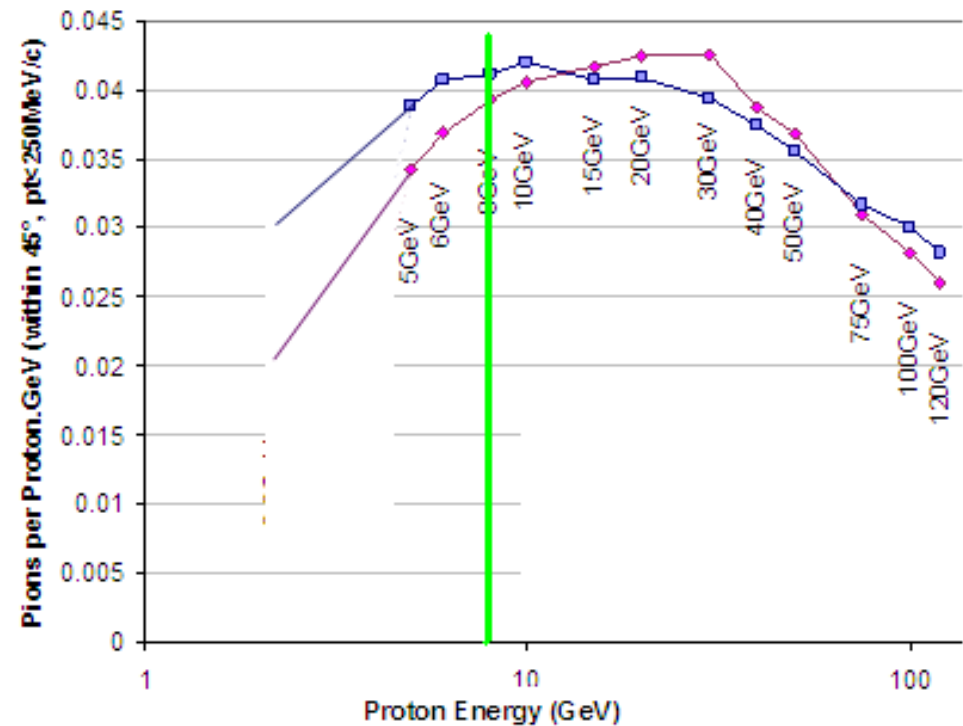
- Lower Backgrounds than Conventional Beams
- Only way to study CP Violation if θ_{13} small
- Fermilab is only plausible US location
- Ongoing BNL-Fermi Collaboration

Errors in CP angle δ



Study 8 GeV Linac Booster for Neutrino Factory

- Energy appears good



- Will Require an Accumulator
 $\leq 30/60$ bunches/sec
- For 2/4 MW: $\geq 5 \cdot 10^{13}$ protons per bunch
- Bunch Compression < 3 nsec rms will be difficult
- Space charge may be a problem
- Last Study (II) used $1.6 \cdot 10^{13}$ p's at 24 GeV was easier
- Subject for BNL/Fermi Collaboration ?

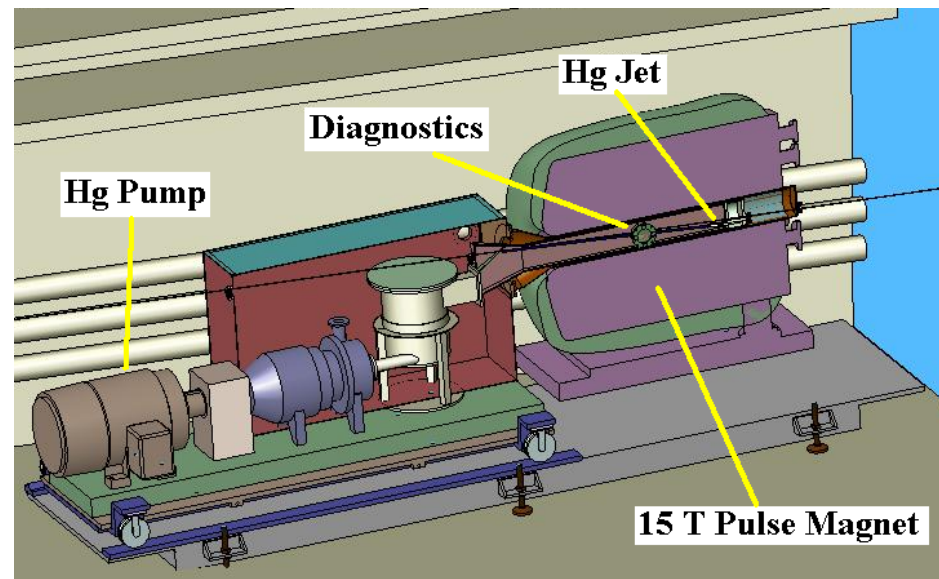
Mercury Target Studies

Possible Interest for Long Baseline Experiment

- May give more low energy pions $\rightarrow \nu$'s from 120 GeV beam
- Smaller source will help horn performance
- Should take 4 MW
- Needs Simulation Study: Subject for BNL/Fermi Collab. ?

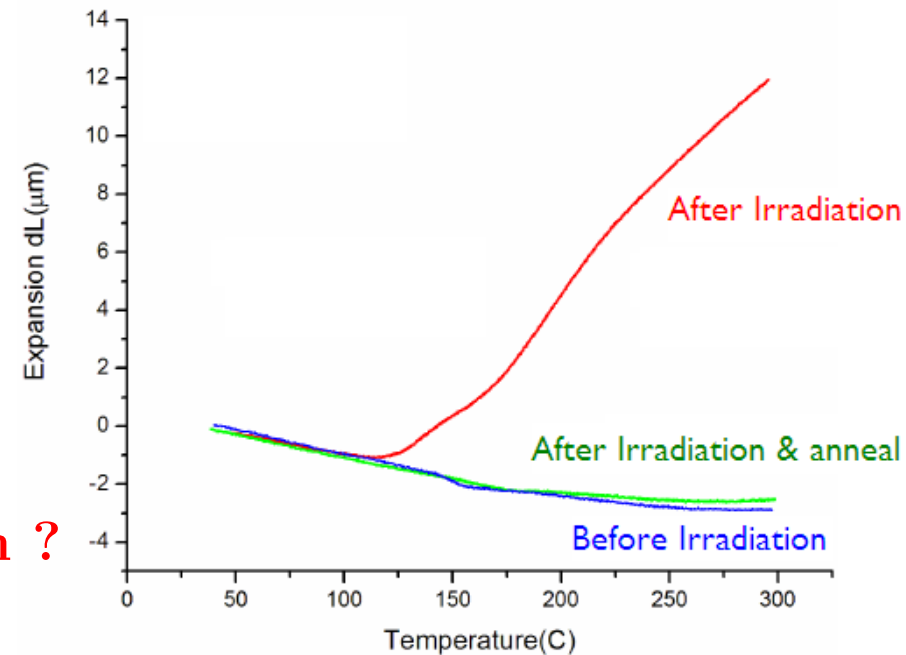
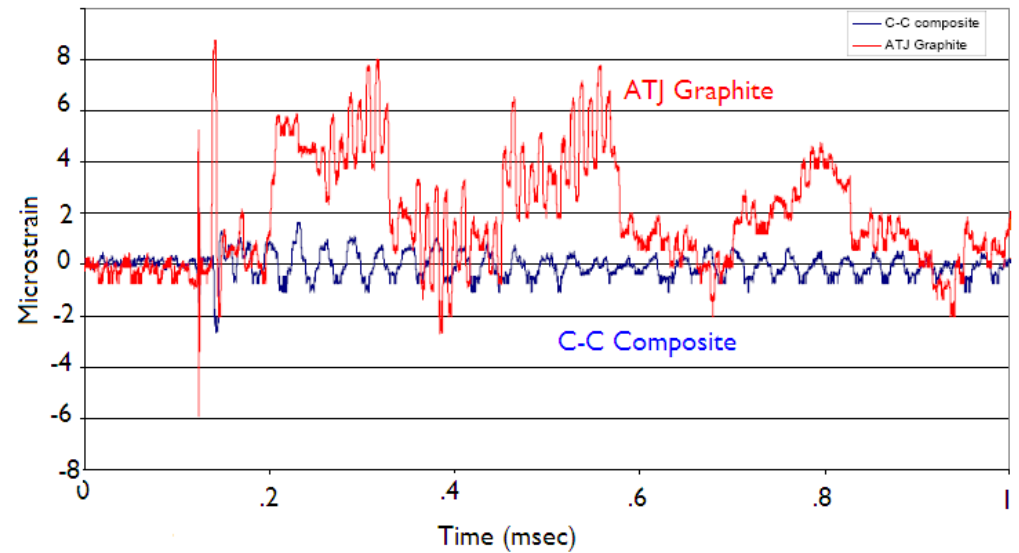
Approved CERN Experiment MERIT

- **32 Tp** as required for 4 MW
- 15 T pulsed Magnet completed
- Ongoing
Fermi-BNL collaboration



Solid target Studies

- Many Materials Studied
- Including
 - C-C Composite Carbon
 - Graphite (NUMI Target)
 - Nickel on Aluminum (NUMI Horn)
- C-C has Reduced Shock Due to Low Thermal Expansion
- Moderate Radiation increased it
- But Annealing restored it
- Needs Study with larger doses
- Now unfunded
- Subject for BNL/Fermi Collaboration ?



Conclusion

- Ongoing Collaborations
 - Neutrino Factory Design
 - Mercury Target Experiment
 - Solid Target Studies
- Possible New Collaborations
 - Proton Driver Study
 - Low Energy Neutrino Beam using Mercury
 - High Dose C-C and Nickel Aluminum Studies